

REMARKS/ARGUMENTS

Claims 1-4 and 6-97 are pending. Claim 5 was previously canceled, without prejudice, as opposed to being withdrawn from consideration, as asserted by the Examiner.

Claims 28, 29 and 43-61 are allowed.

Claims 1-4, 6-27, 30, 32, 62-66, 69, 70, 75 and 87-97 stand rejected.

Claims 13, 14, 17, 20, 21, 23-26, 34-42, 71-74, 77, 79-86, 89-93 and 95-97 stand objected to.

Claims 9, 67 and 88 have been canceled, without prejudice.

Claims 1, 7, 8, 16-18, 20, 21, 27, 30, 32, 33, 40, 62, 80, 87, 94 and 98 have been amended. Support for these amendments can be found throughout the specification and drawings, as originally filed.

New claims 98-164 have been added. Support for these claims can be found throughout the specification and drawings, as originally filed.

The specification has been amended to correct various typographical errors. Support for these amendments can be found throughout the specification and drawings, as originally filed. The Applicants aver that no new matter has been added.

This response is submitted in response to a final office action. The Applicants submit that the instant response places the application in a condition for allowance, or alternatively, in better form for appeal.

The Applicants express their appreciation to the Examiner for the courtesies extended to the Applicants' attorney, Preston Smirman, during telephonic interviews conducted on February 4, 2004 and April 6, 2004.

SPECIFICATION OBJECTIONS

The disclosure stands objected to because of several minor informalities.

The Applicants have amended the specification in accordance with the Examiner's suggestions. Additionally, the Applicants have amended the disclosure to incorporate changes that were previously presented in the substitute specification. In light of the Examiner's refusal to enter the substitute specification, the Applicants have instead submitted the same changes in the form of amendments in the instant response. Accordingly, the Applicants renew their request to enter the previously filed substitute specification.

Accordingly, the Applicants submit that the objections to disclosure have been overcome.

CLAIM OBJECTIONS

Claims 40 and 80 stand objected to because of alleged informalities.

The Applicants have amended claims 40 and 80 in accordance with the Examiner's suggestion. Additionally, the Applicants have amended claim 20, which also contained the same informality as claims 40 and 80.

Accordingly, the Applicants submit that the objections to claims 40 and 80 have been overcome.

35 USC §112, FIRST PARAGRAPH, REJECTION

Claims 1-27, 30, 32 and 87-97 stand rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement.

The Applicants respectfully traverse the 35 USC §112, first paragraph, rejection of claims 1-27, 30, 32 and 87-97.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claims 1, 27, 30, 32, 87, 88 and 94 in accordance with the Examiner's suggestion. Accordingly, the Applicants submit that claims 1, 27, 30, 32, 87, 88 and 94 comply with the written description requirement. Furthermore dependent claims 2-26 and 89-93, which depend from independent claims 1 and 87, respectively, likewise comply with the written description requirement.

Accordingly, the Applicants submit that the 35 USC §112, first paragraph, rejection of claims 1-27, 30, 32 and 87-97 has been overcome.

35 USC §112, SECOND PARAGRAPH, REJECTION

Claim 94 stands rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The Applicants respectfully traverse the 35 USC §112, second paragraph, rejection of claim 94.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 94 in accordance with the Examiner's suggestion.

Accordingly, the Applicants submit that the 35 USC §112, second paragraph, rejection of claim 94 has been overcome.

35 USC §102(b) REJECTION

Claims 62-66, 70 and 75 stand rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,545,014 to Sundberg et al.

The Applicants respectfully traverse the 35 USC §102(b) rejection of claims 62-66, 70 and 75.

The law is clear that a claim in dependent form shall be construed to incorporate all the limitations of the claim to which it refers. 35 U.S.C. §112 ¶ 4.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended

claim 62 to recite, among other things, a variable displacement vane pump, comprising:

- (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure;
- (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface;
- (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor;
- (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor;
- (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction, wherein the first actuator is responsive to a first actuation pressure signal;
- (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the second actuator is responsive to a second actuation pressure signal;
- (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and
- (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Sundberg et al. discloses no such structure. Furthermore, the Examiner stated, in the Examiner-Initiated Interview Summary of February 4, 2004, that introducing the

subject matter of claim 67 into claim 62 would overcome the prior art of record, including Sundberg et al.

Accordingly, the Applicants submit that claim 62 is not anticipated by Sundberg et al. Furthermore, dependent claims 63-66, 70 and 75, which depend from and further define independent claim 62, are likewise not anticipated by Sundberg et al.

Accordingly, the Applicants submit that the 35 USC §102(b) rejection of claims 62-66, 70 and 75 has been overcome.

35 USC §102(b) REJECTION

Claims 62-65, 70 and 75 stand rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,545,018 to Sundberg.

The Applicants respectfully traverse the 35 USC §102(b) rejection of claims 62-65, 70 and 75.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 62 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and

having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction, wherein the first actuator is responsive to a first actuation pressure signal; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the second actuator is responsive to a second actuation pressure signal; (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Sundberg discloses no such structure. Furthermore, the Examiner stated, in the Examiner-Initiated Interview Summary of February 4, 2004, that introducing the subject matter of claim 67 into claim 62 would overcome the prior art of record, including Sundberg.

Accordingly, the Applicants submit that claim 62 is not anticipated by Sundberg. Furthermore, dependent claims 63-65, 70 and 75, which depend from and further define independent claim 62, are likewise not anticipated by Sundberg.

35 USC §102(b) REJECTION

Claims 62-65, 70 and 75 stand rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 3,918,855 to Bornholdt.

The Applicants respectfully traverse the 35 USC §102(b) rejection of claims 62-65, 70 and 75.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 62 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction, wherein the first actuator is responsive to a first actuation pressure signal; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the second actuator is responsive to a second actuation pressure signal; (7) an area defining a fluid chamber formed

between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Bornholdt discloses no such structure. Furthermore, the Examiner stated, in the Examiner-Initiated Interview Summary of February 4, 2004, that introducing the subject matter of claim 67 into claim 62 would overcome the prior art of record, including Bornholdt.

Accordingly, the Applicants submit that claim 62 is not anticipated by Bornholdt. Furthermore, dependent claims 63-65, 70 and 75, which depend from and further define independent claim 62, are likewise not anticipated by Bornholdt.

35 USC §102(b) REJECTION

Claims 62-66, 69, 70 and 75 stand rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,141,418 to Ohtaki et al.

The Applicants respectfully traverse the 35 USC §102(b) rejection of claims 62-66, 69, 70 and 75.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 62 to recite, among other things, a variable displacement vane pump, comprising:

(1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction, wherein the first actuator is responsive to a first actuation pressure signal; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the second actuator is responsive to a second actuation pressure signal; (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Ohtaki et al. discloses no such structure. Furthermore, the Examiner stated, in the Examiner-Initiated Interview Summary of February 4, 2004, that introducing the

subject matter of claim 67 into claim 62 would overcome the prior art of record, including Ohtaki et al.

Accordingly, the Applicants submit that claim 62 is not anticipated by Ohtaki et al. Furthermore, dependent claims 63-66, 70 and 75, which depend from and further define independent claim 62, are likewise not anticipated by Ohtaki et al.

35 USC §103(a) REJECTION

Claims 1-4, 6, 9, 10, 15, 22, 27, 32, 62-66, 69, 70, 75, 87, 88 and 94 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,710,106 to Iwata et al. and further in view of U.S. Patent No. 5,141,418 to Ohtaki et al. as applied to claims 62-66, 69, 70 and 75.

The Applicants respectfully traverse the 35 USC §103(a) rejection of claims 1-4, 6, 9, 10, 15, 22, 27, 32, 62-66, 69, 70, 75, 87, 88 and 94. Claims 9 and 88 have been canceled, without prejudice.

The standard for obviousness is that there must be some suggestion, either in the reference or in the relevant art, of how to modify what is disclosed to arrive at the claimed invention. In addition, "[s]omething in the prior art as a whole must suggest the desirability and, thus, the obviousness, of making" the modification to the art suggested by the Examiner. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051, 5 U.S.P.Q.2d (BNA) 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988). Although the Examiner may suggest the teachings of a primary reference could be modified to

arrive at the claimed subject matter, the modification is not obvious unless the prior art also suggests the desirability of such modification. *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d (BNA) 1397, 1398 (Fed. Cir.1989). There must be a teaching in the prior art for the proposed combination or modification to be proper. *In re Newell*, 891 F.2d 899, 13 U.S.P.Q.2d (BNA) 1248 (Fed. Cir. 1989). If the prior art fails to provide this necessary teaching, suggestion, or incentive supporting the Examiner's suggested modification, the rejection based upon this suggested modification is error and must be reversed. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d (BNA) 1566 (Fed. Cir. 1990).

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 1 to recite, among other things, a variable displacement vane pump, comprising:

- (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure;
- (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface;
- (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor;
- (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor;
- (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction;
- (6) a second actuator responsive to application of fluid under pressure and operable to pivot the

containment ring or eccentric ring in a second direction, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests such structure as recited in claim 1. More specifically, neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 1 is not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith. Furthermore, dependent claims 2-4, 6, 10, 15 and 22, which depend from and further define independent claim 1, are likewise not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 27 to recite, among other things, a variable displacement vane-type fluid pump, comprising: (1) a housing defining a pump inlet through which fluid enters the pump, a pump outlet from which fluid is discharged under pressure and a fluid chamber between the pump inlet and pump outlet; (2) a containment ring or eccentric ring pivotally carried by the housing within the fluid chamber for movement between a first position and a second position, the containment ring or eccentric ring having an interior opening with an internal surface; (3) a rotor carried by the housing at least in part in the interior opening of the containment ring or eccentric ring, driven for rotation relative to the internal surface and having a plurality of slots extending radially inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with a vane slidably received in each slot in the rotor; (5) a first actuator responsive to a first fluid pressure and operable to pivot the containment ring or eccentric ring toward its first position; (6) a second actuator responsive to a second fluid pressure and operable to pivot the containment ring or eccentric ring toward its second position; (7) a control valve responsive to the differential between a first pressure signal and a second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions, wherein control and positioning of the first and second actuators are a function of a combination of the first pressure signal and the second pressure signal taken from

discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; and (8) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests such structure as recited in claim 27. More specifically, neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 27 is not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 32 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and

having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the first and second actuators are fluid acting directly on the containment ring, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests such structure as recited in claim 32. More specifically, neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the

housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 32 is not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 62 to recite, among other things, a variable displacement vane pump, comprising:

- (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure;
- (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface;
- (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor;
- (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor;
- (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction, wherein the first actuator is responsive to a first actuation pressure signal;
- (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the second actuator is responsive to a second actuation pressure signal;
- (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in

the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests such structure as recited in claim 62. More specifically, neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 62 is not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith. Furthermore, dependent claims 63-66, 69, 70 and 75, which depend from and further define independent claim 62, are likewise not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 87 to recite, among other things, a variable displacement pump system, comprising: (1) a pump assembly including a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the pump assembly

under pressure; (2) a first actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a first displacement position; (3) a second actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a second displacement position, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (4) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (5) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests such structure as recited in claim 87. More specifically, neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 87 is not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 94 to recite, among other things, a variable displacement pump system, comprising: (1) a pump assembly including a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the pump assembly under pressure; (2) a first actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a first displacement position; and (3) a second actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a second displacement position; (4) a flow control valve for mechanically varying the pump displacement; (5) a compression spring connectable at a first spring end to a spool of the flow control valve, wherein the compression spring maintains pressure on the flow control valve during regular operation, and provides return pressure in the absence of a pilot pressure on the flow control valve; (6) a target piston connected to the second end of the compression spring, wherein the target piston exerts a force on the compression spring, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit acting on the target piston and the flow control valve for providing a variable pressure

target for regulation of the pump's displacement in response to varying engine speeds; and (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; wherein the flow control valve is responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests such structure as recited in claim 94. More specifically, neither Iwata et al. and/or Ohtaki et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 94 is not unpatentable over Iwata et al. and/or Ohtaki et al., either alone or in combination therewith.

35 USC §103(a) REJECTION

Claims 1, 7, 8, 16, 18, 19, 33, 62-69, 76, 78, 87, 88 and 94 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,710,106 to Iwata et al. and further in view of JP3262294790A to Takagi et al.

The Applicants respectfully traverse the 35 USC §103(a) rejection of claims 1, 7, 8, 16, 18, 19, 33, 62-69, 76, 78, 87, 88 and 94. Claims 7, 67 and 88 have been canceled, without prejudice.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 1 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric

ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests such structure as recited in claim 1. More specifically, neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a control valve responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 1 is not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith. Furthermore, dependent claims 7, 8, 16, 18, and 19, which depend from and further define independent claim 1, are likewise not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 33 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure;

(2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction; (7) a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; (8) another fluid chamber defined at least in part by the seal with fluid under pressure in the another fluid chamber defining the second actuator; and (9) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests such structure as recited in claim 33. More specifically, neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a control valve

responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 33 is not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 62 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction, wherein the first actuator is responsive to a first actuation pressure signal; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein the second actuator is responsive to a second actuation pressure signal; (7) an area defining a fluid chamber formed

between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests such structure as recited in claim 62. More specifically, neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a control valve responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 62 is not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith. Furthermore, dependent claims 63-66, 68, 69, 76 and 78, which depend from and further define independent claim 62, are likewise not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 87 to recite, among other things, a variable displacement pump system, comprising: (1) a pump assembly including a pump inlet through which fluid enters the

housing and a pump outlet through which fluid is discharged from the pump assembly under pressure; (2) a first actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a first displacement position; (3) a second actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a second displacement position, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (4) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (5) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests such structure as recited in claim 87. More specifically, neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a control valve responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 87 is not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 94 to recite, among other things, a variable displacement pump system, comprising: (1) a pump assembly including a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the pump assembly under pressure; (2) a first actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a first displacement position; and (3) a second actuator responsive to application of fluid under pressure and operable to cause displacement of the pump assembly towards a second displacement position; (4) a flow control valve for mechanically varying the pump displacement; (5) a compression spring connectable at a first spring end to a spool of the flow control valve, wherein the compression spring maintains pressure on the flow control valve during regular operation, and provides return pressure in the absence of a pilot pressure on the flow control valve; (6) a target piston connected to the second end of the compression spring, wherein the target piston exerts a force on the compression spring, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit acting on the target piston and the flow control valve for providing a variable pressure

target for regulation of the pump's displacement in response to varying engine speeds; and (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; wherein the flow control valve is responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests such structure as recited in claim 94. More specifically, neither Iwata et al. and/or Takagi et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a control valve responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 94 is not unpatentable over Iwata et al. and/or Takagi et al., either alone or in combination therewith.

35 USC §103(a) REJECTION

Claims 30 and 31 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,710,106 to Iwata et al. in view of U.S. Patent No. 5,141,418 to

Ohtaki et al. as applied to claims 1-6, 9, 10, 15, 22, 27, 32, 62-66, 69, 70, 75, 87, 88 and 94, and further in view of U.S. Patent No. 4,468,173 to Dantlgraber.

The Applicants respectfully traverse the 35 USC §103(a) rejection of claims 30 and 31.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 30 to recite, among other things, a variable displacement vane-type fluid pump, comprising: (1) a housing defining a pump inlet through which fluid enters the pump, a pump outlet from which fluid is discharged under pressure and a fluid chamber between the pump inlet and pump outlet; (2) a containment ring or eccentric ring pivotally carried by the housing within the fluid chamber for movement between a first position and a second position, the containment ring or eccentric ring having an interior opening with an internal surface; (3) a rotor carried by the housing at least in part in the interior opening of the containment ring or eccentric ring, driven for rotation relative to the internal surface and having a plurality of slots extending radially inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with a vane slidably received in each slot in the rotor; (5) a first actuator responsive to a first control pressure and operable to pivot the containment ring or eccentric ring toward its first position; (6) a second actuator responsive to a second control pressure and operable to pivot the containment ring or eccentric ring toward its second position; (7) a control circuit responsive to engine conditions for providing a variable targeting of pump output

wherein pressure from the oil circuit in the engine acts on the first actuator and pressure from the outlet acts on the second actuator for variable control of the containment ring in response to these conditions, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (8) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (9) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al., Ohtaki et al., and/or Dantlgraber, either alone or in combination therewith, suggests such structure as recited in claim 30. More specifically, neither Iwata et al., Ohtaki et al., and/or Dantlgraber, either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator, and/or a control valve responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 30 is not unpatentable over Iwata et al., Ohtaki et al., and/or Dantlgraber, either alone or in combination therewith. Furthermore, dependent claim 31, which depends from and further defines independent claim 30, is likewise not unpatentable over Iwata et al., Ohtaki et al., and/or Dantlgraber, either alone or in combination therewith.

35 USC §103(a) REJECTION

Claims 30 and 31 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,710,106 to Iwata et al. in view of U.S. Patent No. 5,141,418 to Ohtaki et al. as applied to claims 1-6, 9, 10, 15, 22, 27, 32, 62-66, 69, 70, 75, 87, 88 and 94, and further in view of U.S. Patent No. 5,052,896 to Fischer et al.

The Applicants respectfully traverse the 35 USC §103(a) rejection of claims 30 and 31.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 30 to recite, among other things, a variable displacement vane-type fluid pump, comprising: (1) a housing defining a pump inlet through which fluid enters the pump, a pump outlet from which fluid is discharged under pressure and a fluid chamber between the pump inlet and pump outlet; (2) a containment ring or eccentric ring pivotally carried by the housing within the fluid chamber for movement between a first position and a second position, the containment ring or eccentric ring having an interior opening with

an internal surface; (3) a rotor carried by the housing at least in part in the interior opening of the containment ring or eccentric ring, driven for rotation relative to the internal surface and having a plurality of slots extending radially inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with a vane slidably received in each slot in the rotor; (5) a first actuator responsive to a first control pressure and operable to pivot the containment ring or eccentric ring toward its first position; (6) a second actuator responsive to a second control pressure and operable to pivot the containment ring or eccentric ring toward its second position; (7) a control circuit responsive to engine conditions for providing a variable targeting of pump output wherein pressure from the oil circuit in the engine acts on the first actuator and pressure from the outlet acts on the second actuator for variable control of the containment ring in response to these conditions, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (8) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (9) a control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al., Ohtaki et al., and/or Fischer et al., either alone or in combination therewith, suggests such structure as recited in claim 30. More specifically, neither Iwata et al., Ohtaki et al., and/or Fischer et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator, and/or a control valve responsive to the first pressure signal to control application of the fluid under pressure to the first actuator, and responsive to the second pressure signal to control application of the fluid under pressure to the second actuator.

Accordingly, the Applicants submit that claim 30 is not unpatentable over Iwata et al., Ohtaki et al., and/or Fischer et al., either alone or in combination therewith. Furthermore, dependent claim 31, which depends from and further defines independent claim 30, is likewise not unpatentable over Iwata et al., Ohtaki et al., and/or Fischer et al., either alone or in combination therewith.

35 USC §103(a) REJECTION

Claims 11 and 12 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,710,106 to Iwata et al. in view of U.S. Patent No. 5,141,418 to Ohtaki et al. as applied to claims 1-4, 6, 9, 10, 15, 22, 27, 32, 62-66, 69, 70, 75, 87, 88 and 94, and further in view of U.S. Patent No. 4,850,269 to Hancock et al.

The Applicants respectfully traverse the 35 USC §103(a) rejection of claims 30 and 31.

In the interests of expediting the prosecution of the instant application, and without admission that any amendment is necessary, the Applicants have amended claim 1 to recite, among other things, a variable displacement vane pump, comprising: (1) a housing defining a chamber, a pump inlet through which fluid enters the housing and a pump outlet through which fluid is discharged from the housing under pressure; (2) a containment ring or eccentric ring pivotally carried by the housing for movement between a first position and a second position and defining an opening with an internal surface; (3) a rotor carried by the housing for rotation relative to the internal surface and having a plurality of slots extending inwardly into the rotor from an exterior of the rotor; (4) a plurality of vanes carried by the rotor with each vane slidably received in a slot in the rotor; (5) a first actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a first direction; (6) a second actuator responsive to application of fluid under pressure and operable to pivot the containment ring or eccentric ring in a second direction, wherein control and positioning of the first and second actuators are a function of a combination of a first pressure signal and a second pressure signal taken from discrete locations separated by a degree of inherent hydraulic resistance in a downstream fluid circuit; (7) an area defining a fluid chamber formed between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator; and (8) a

control valve responsive to the differential between the first pressure signal and the second pressure signal to selectively apply, based on engine conditions, application of fluid under pressure to either the first or second actuator based on engine conditions.

Neither Iwata et al., Ohtaki et al., and/or Hancock et al., either alone or in combination therewith, suggests such structure as recited in claim 1. More specifically, neither Iwata et al., Ohtaki et al., and/or Hancock et al., either alone or in combination therewith, suggests a variable displacement pump system that employs, among other things, a seal between the containment ring or eccentric ring and the housing defining a fluid chamber between the housing and containment ring or eccentric ring with fluid under pressure in the fluid chamber defining the first actuator.

Accordingly, the Applicants submit that claim 1 is not unpatentable over Iwata et al., Ohtaki et al., and/or Hancock et al., either alone or in combination therewith. Furthermore, dependent claims 11 and 12, which depend from and further define independent claim 1, are likewise not unpatentable over Iwata et al., Ohtaki et al., and/or Hancock et al., either alone or in combination therewith.

ALLOWABLE SUBJECT MATTER

Claims 13, 14, 17, 20, 21, 23-26, 34-42, 71-74, 77, 79-86, 89-93 and 95-97 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 28, 29, 43-61 are allowed.

The Applicants have rewritten dependent claims 13, 34, 71, 89, and 95 in independent form, including all of the limitations of the base claim and any intervening claims, and present same as new claims 98-164, including claims dependent therefrom.

CONCLUSION

In view of the foregoing, the Applicant respectfully requests reconsideration and reexamination of the Application. The Applicant respectfully submits that each item raised by the Examiner in the Final Office Action of February 27, 2004 has been successfully traversed, overcome or rendered moot by this response. The Applicant respectfully submits that each of the claims in this Application is in condition for allowance and such allowance is earnestly solicited.

The Examiner is invited to telephone the Applicant's undersigned attorney at (248) 364-4300 if any unresolved matters remain.


Any needed extension of time is hereby requested with the filing of this document.

The Commissioner is authorized to charge any additional fees or credit any overpayment to Deposit Account No. 50-1612. A duplicate copy of this letter is enclosed herewith.

Respectfully submitted,

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